WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005NC44B

Title: Use of Indicators to Distinguish Between Point and Non-Point Sources of Chemical Contamination in North Carolina Streams

Project Type: Research

Focus Categories: Agriculture, Non Point Pollution

Keywords: chemical monitoring, endocrine active substances, organic compounds, pharmaceutically active substances, pollutants, runoff, septic tanks, wastewater treatment

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $18,596

Non-Federal Matching Funds: $37,191

Congressional District: 4

Principal Investigator:
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Abstract

Effluent discharged into receiving streams from wastewater treatment plants has to meet National Pollutant Discharge Elimination System permit levels on a variety of parameters that are designed to protect the stream's ecology and aquatic life from deleterious effects and to ensure that the natural flora and fauna can remediate the residual chemicals and micro-organisms prior to subsequent usage. As new chemicals are constantly being introduced into the domestic and industrial market, it is inevitable that they will be found in the raw waters entering these treatment plants. When their presence in receiving streams is undesirable, research studies are implemented to evaluate alternate approaches to control their levels in plant effluents. No equivalent gesture is guaranteed for the same fate of these chemicals originating from nonpoint sources. Consequently, downstream reservoirs and lakes are likely to be sinks for many of these compounds from a variety of unregulated sources. The management of nonpoint source contamination wasn't designed to account for the presence of chemicals with far different properties to those mimicking natural compounds and the presence of pharmaceutically and endocrine active chemicals with biological functions in environmental waters is testament to the ineffectiveness of current contaminant control. Drugs used for human and animal therapy and endocrine-

disrupting compounds are introduced into agricultural systems via land application of recycled wastewater and accumulated biosolids as well as through direct usage of pesticides. The widespread domestic use of many of these compounds also ensures that they will be present in septic systems and in landfills. Leakage and runoff from any of these systems will contribute significant loading into receiving waters and contribute to impairment. It is unknown what percentage of accumulations of these compounds derive from point and non-point sources but from extrapolation of what is known about nonpoint pollution from regulated compounds, the contribution from the nonpoint sources is likely to be very significant.

Until now, it has been a major challenge to provide an effective strategy that would permit identification of non-point sources of chemical pollution as distinct from point sources. This proposal will investigate the use of chemical profiling that distinguishes between point and non-point sources of pollution and develop an approach for characterizing the contributions of surrogate measures of chemical contamination in the form of antibiotics and endocrine disrupting hormones and pesticides from land application runoff and on-site wastewater treatment seepage. The results of this study will provide an indication of the relative contributions to overall pollution from chemicals originating in both point and non-point sources and a strategy that can be applied to survey the impaired streams for these chemicals in North Carolina.